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DAVIES GILBERT, Esq., V.P., in the Chair.

A paper was read, entitled "Note relative to the supposed origin of the deficient rays in the Solar Spectrum; being an account of an experiment made at Edinburgh during the Annular Eclipse of May 15, 1836." By James D. Forbes, Esq., Professor of Natural Philosophy in the University of Edinburgh.

The observation that some of the rays of light, artificially produced, are absorbed by transmission through nitrous acid gas, had suggested to Sir David Brewster the idea that the dark spaces in the solar prismatic spectrum may, in like manner, be occasioned by the absorption of the deficient rays during their passage through the sun's atmosphere. It occurred to the author that the annular eclipse of the sun of the present year would afford him an opportunity of ascertaining whether any difference in the appearance of the spectrum could be detected when the light came from different parts of the solar disc, and had consequently traversed portions of the sun's atmosphere of very different thickness; and that accurate observations of this kind would put the hypothesis in question to a satisfactory test. The result of the experiment was that no such differences could be perceived; thus proving, as the author conceives, that the sun's atmosphere is in no way concerned with the production of the singular phenomenon of the existence of dark lines in the solar spectrum.

A paper was also read, entitled "On the connexion of the anterior columns of the Spinal Cord with the Cerebellum; illustrated by preparations of these parts in the Human subject, the Horse, and the Sheep." By Samuel Solly, Esq., Lecturer on Anatomy and Physiology at St. Thomas's Hospital, M.R.I., Fellow of the Royal Medical and Chirurgical Society, and Member of the Hunterian Society. Communicated by P. M. Roget, M.D., Sec. R.S.

The exact line of demarcation between the tracts of nervous matter, subservient to motion and to sensation, which compose the spinal cord, has not yet been clearly determined. The proofs which exist of a power residing in the cerebellum which regulates and controls the

actions of muscles, would lead us to suppose that the fibres of the motor nerves are continuous with those of the cerebellum; but hitherto no observations have been made which prove the existence of this connexion; and it is the object of the author, in this paper, to establish, by a more careful examination of the anatomical structure of this part of the nervous system, such continuity of fibres between the anterior columns of the spinal cord and the cerebellum. The corpora pyramidalia have been hitherto considered as formed by the entire mass of the anterior, or motor columns of the spinal cord; but the author shows that not more than one half of the anterior columns enters into the composition of these bodies: and that another portion, which he terms the *antero-lateral* column, when traced on each side in its progress upwards, is found to cross the cord below the corpora olivaria, forming, after mutual decussation, the surface of the corpora restiformia; and ultimately being continuous with the cerebellum. These fibres are particularly distinct in the medulla oblongata of the sheep and of the horse. The author conceives that the office of the antero-lateral columns is to minister to the involuntary, as well as to the voluntary movements: that the facial nerve arises from both the voluntary and involuntary tracts; and that the pneumogastric nerve arises both from the involuntary and the sensory tracts.

June 9, 1836.

FRANCIS BAILY, Esq., V.P. and Treasurer, in the Chair.

“ Discussion of the Magnetical Observations made by Captain Back, R.N., during his late Arctic Expedition. By Samuel Hunter Christie, Esq., M.A., F.R.S.

The author, having been consulted by Captain Back, previous to the departure of the latter, in 1833, with the expedition for the relief of Captain Ross, respecting the nature of the magnetical observations which it might be desirable to make in the regions he was about to visit, and considering that, with a view to the attainment of the principal object of the expedition, the greatest economy of time in making these observations was of the first importance, limited his suggestions, in the first instance, to the methods proper to be employed for determining the direction and the dip of the needle, but more especially the latter. Captain Back, immediately on his return, placed all his magnetical observations at the disposal of Mr. Christie, who having since completed their reduction, gives, in the present paper, the results of his labours.

The first part of the paper relates to the observations of the Dip of the magnetic needle. With a view to economize as much as possible the time consumed in making each observation, the process of inverting the poles of the needle, which is usually resorted to in each instance, was here dispensed with. But in order that the dip may be determined independently of this operation, it is necessary not only that the position of the centre of gravity of the needle employed should be ascertained, but that it should be permanent. In giving an account of the observations made to verify this condition, the author com-

mences with those at Fort Reliance, which was the first winter station of the expedition; and where the dip was determined by observations of the needle, both with direct and also with inverted poles. The author then enters upon an investigation of formulæ for the determination of the dip by means of a needle, in which the value of a certain angle, denoted by the symbol γ , determining the position of the centre of gravity, has been ascertained; and, conversely, for the determination of the value of the same angle, or, which is equivalent to it, the position of the centre of gravity of the needle, when the dip at the place of observation is given. He next inquires whether any tests can be applied to the observations under discussion, which may indicate the extent of the errors by which the results deduced from them may be affected; and he employs for this purpose the values of the terrestrial magnetic intensity furnished by certain equations obtained in the preceding investigation; making the proper allowances, first, for the needles used being ill adapted to this method of determining the relative intensities; secondly, for errors of observation in determining the times of vibration of the needle; and thirdly, for disturbing causes which might affect the observations. Considerable differences were found to exist in the results obtained by the two methods, at New York, Montreal, Fort Alexander, Montreal Island, and Fort Ogle; differences which can be accounted for only by errors in the assumed magnitude of the angle γ , and which, consequently, indicate the want of permanence in that angle. It was necessary, therefore, to inquire what changes in the angle γ will account for these discrepancies, and how far the value of the dip, thus obtained, may be affected by them. Formulæ are then deduced by which these changes may be determined.

From a comparison of the observed and computed values of the angles involved in these investigations, the author infers that the differences between those of one of these angles are, with a few exceptions, contained within the limits of the errors incident to dip observations: but with respect to the other angle, they in general exceed those limits. Upon the whole, he concludes that the discrepancies which appear between the values of the terrestrial intensity, as deduced from the times of vibration of the needle, and from the observed angles of inclination to the horizon, are principally attributable to a want of absolute permanence in its axis of motion. In the present case, the centre of gravity of the needle being nearly coincident with the axis, a very minute derangement in that axis would cause a considerable change in the value of the angle γ ; so that the existence of differences in the values of this angle do not warrant the inference that the needle itself received any serious injury during the expedition; to which, indeed, from the care taken of it by Captain Back, it could not well have been liable.

The second part of the paper relates to the observations of the variation of the magnetic needle, which are already published in Capt. Back's narrative, and which are here introduced for the purpose of applying them, in conjunction with the observations of the dip, detailed

in the preceding part, to a formula deduced from theory, with the view of ascertaining how far they may tend to support that theory.

The third section is devoted to the comparison of the observations of the dip and variation of the needle with theoretical results of a more general kind. The observations made by Captain Back are peculiarly adapted for verifying the hypotheses on which the theories of terrestrial magnetism rest, and that theory, in particular, which assumes the existence of two magnetic poles, symmetrically situated in a diameter of the earth, and near to its centre: for, on this hypothesis, the poles of verticity and of convergence will coincide; and the tangent of the dip will be equal to twice the tangent of the magnetic latitude. In no case has a progress towards the magnetic pole been made so directly, and to such an extent, as in the present expedition; whether that point be considered as the point of convergence of magnetic meridians, or that at which the direction of the force is vertical. It is deducible from the theory that the product of the tangent of the dip by the tangent of the polar distance is equal to two: and therefore, if the distance of the pole of convergence from two stations be determined by means of the observed variations at those stations, we may estimate, by the approximation of this product to the number two, in each case, the degree of coincidence which exists between theory and observation. A table is then given, exhibiting the several data on which this comparison is made, and the results deduced from them. From an inspection of the numbers in the column which indicate the deviations from theory it appears that there is not, in general, that accordance between the observations and the theory which might reasonably have been expected; and that although that theory may serve as a first approximation, yet it requires to be considerably modified to reconcile it with the observations. Hence the author arrives at the general conclusion that, unless considerable errors have crept into the observations of either the dip or the variation, the theoretical pole of verticity does not coincide with the pole of convergence, even when the positions of these points are deduced from observations made at very limited distances from those poles.

“On the Safety-valve of the right Ventricle of the Heart in Man; and on the gradations of the same apparatus in Mammalia and Birds.”
By J. W. King, Esq. Communicated by Thomas Bell, Esq., F.R.S.

In this paper additional evidence is given by the author in corroboration of the principles which he had announced in a former communication, which was read to the Royal Society in May 1835, on the influence of the tricuspid valve of the heart on the circulation of the blood. His object is to demonstrate that the tricuspid valve in man occasionally serves the purpose of a safety-valve, being constructed so as to allow of the reflux of the blood from the ventricle into the auricle, during the varying states of distension to which the right cavities of the heart are at times subjected; that a similar function is maintained in the greater number of animals possessing a double circulation, and also that in the different orders of these animals the structure of this

valve is expressly adapted to the production of an effect of this kind, in various degrees, corresponding with the respective characters and habits of each tribe. He is thus led to conclude that the function which the tricuspid valve exercises exhibits, in the extent of its development, a regular gradation, when followed throughout the different orders of Mammalia and Birds; and that it extends even to some Reptiles.

The force with which the circulating blood is impelled by the general venous trunks into the heart, and which is dependent on the action of the arterial system, the degree of compression arising from muscular action, combined with the resistance of the valves of the veins, and is also influenced by occasional accumulations of blood from rapid absorption, from impeded respiration, and from cold applied to the surface of the body, is shown to be subject to great and sudden variations. Any increase taking place in this force tends to produce distension of the right ventricle of the heart, followed by disturbance in the valvular action of the tricuspid membrane, owing to the displacement of its parts, which thus allows of a considerable reflux of blood into the auricle. Among the Mammalia, the lowest degree of this action, corresponding to that of a safety-valve, is found in the rodent, the marsupial, and the canine tribes. The next in degree is that which occurs in the order of Edentata and the feline genus. The *Quadrumana* occupy the next place in the scale of gradation. The human conformation exhibits this function in a very conspicuous manner, especially in the adult period; for at birth, when the right ventricle is unyielding, it scarcely exists; and in various states of disease the tricuspid valve acts with too much or with too little efficacy. The *Pachydermata* and *Ruminantia* come next in succession. The Seal exhibits this peculiarity in a still higher degree; but in no order of Mammalia does it exist to so great an extent as in the *Cetacea*, which appear, indeed, to possess a peculiar additional provision for effectually securing the permanent performance of this office, which the author compares to that of a safety-valve. A similar function, subject to similar gradations, is likewise traced in different orders of Birds. It is but slight in the *Gallinaceæ*; and rather greater in the *predaceous* tribes. In some of the *Waders* it exists to a considerable extent; but is greatest of all in the orders of *Passerinæ* and *Scansores*. Crocodiles and the *Ornithorhynchus* present some traces of this peculiar provision relatively to the circulation.

"Some Account of the appearances of the Solar Spots, as seen from Hereford, on the 15th and 16th of May, 1836, during and after the Solar Eclipse." By Henry Lawson, Esq., in a Letter to Sir Henry Ellis, K.G.H., F.R.S., by whom it was communicated to the Society.

The spots on the sun's disc, at the period referred to, were very numerous; and one of great size, being many thousand miles in diameter, in particular attracted attention, from its penumbra presenting an appearance similar to a sky filled with small flocculent white clouds, perfectly distinct from one another; while on two sides were seen

large masses of darker clouds, which seemed as if pouring their substance into the central chasm. The figure of the solar spots did not undergo any perceptible change of form during the progressive passage of the edge of the moon over them.

“On the Brain of the Negro, compared with that of the European and the Ourang-Outang.” By Frederick Tiedemann, M.D., Professor of Anatomy and Physiology in the University of Heidelberg, and Foreign Member of the Royal Society.

It has long been the prevailing opinion among naturalists that the Negro race is inferior, both in organization and in intellectual powers, to the European; and that, in all the points of difference, it exhibits an approach to the Monkey tribes. The object of the present paper is to institute a rigid inquiry into the validity of this opinion. The author has, for this purpose, examined an immense number of brains of persons of different sexes, of various ages, and belonging to different varieties of the human race, both by ascertaining their exact weight, and also by accurate measurement of the capacity of the cavity of the cranium; and has arrived at the following conclusions. The weight of the brain of an adult male European varies from 3lbs. 3oz. to 4lbs. 11 oz. troy weight: that of the female weighs, on an average, from 4 to 8 oz. less than that of the male. The brain usually attains its full dimensions at the age of seven or eight; and decreases in size in old age. At the time of birth, the brain bears a larger proportion to the size of the body than at any subsequent period of life, being then as one sixth of the total weight; at two years of age it is one fourteenth; at three, one eighteenth; at fifteen, one twenty-fourth; and in the adult period, that is, from the age of twenty to that of seventy, it is generally within the limits of one thirty-fifth and one forty-fifth. In the case of adults, however, this proportion is much regulated by the condition of the body as to corpulence; being in thin persons from one twenty-second to one twenty-seventh, and in fat persons often only one fiftieth, or even one hundredth of the total weight of the body. The brain has been found to be particularly large in some individuals possessed of extraordinary mental capacity. No perceptible difference exists either in the average weight or the average size of the brain of the Negro and of the European: and the nerves are not larger, relatively to the size of the brain, in the former than in the latter. In the external form of the brain of the Negro a very slight difference only can be traced from that of the European; but there is absolutely no difference whatsoever in its internal structure, nor does the Negro brain exhibit any greater resemblance to that of the ourang-outang than the brain of the European, excepting, perhaps, in the more symmetrical disposition of its convolutions.

Many of the results which the author has thus deduced from his researches are at variance with the received opinions relative to the presumed inferiority of the Negro structure, both in the conformation and relative dimensions of the brain; and he ascribes the erroneous notions which have been hitherto entertained on these subjects chiefly to prejudice created by the circumstance that the facial angle

in the negro is smaller than in the European, and consequently makes, in this respect, an approach to that of the ape, in which it is still farther diminished. The author denies that there is any innate difference in the intellectual faculties of these two varieties of the human race; and maintains that the apparent inferiority of the Negro is altogether the result of the demoralizing influence of slavery, and of the long-continued oppression and cruelty which have been exercised towards this unhappy portion of mankind by their more early civilized, and consequently more successful competitors for the dominion of the world.

June 16.

FRANCIS BAILY, Esq., V.P. and Treasurer, in the Chair.

Moses Montefiore, Esq., was elected a Fellow of the Society.

The following papers were read, viz.

1. "Researches on the Tides; Sixth Series. On the Results of an extensive system of Tide Observations, made on the Coasts of Europe and America, in June 1835." By the Rev. William Whewell, F.R.S., Fellow of Trinity College, Cambridge.

The author having, in several previous communications to the Royal Society, urged the importance of simultaneous tide observations made at distant places, here gives an account of the steps taken to carry this plan into effect, in consequence of his representations, both by the Government in England, and by the other maritime powers of Europe. He explains, in the present paper, the general character of the observations thus obtained, the mode employed in reducing them, and enters at considerable length into a discussion of the immense mass of information which they supply with respect to the phenomena of the tides. One of his principal objects was to fix with precision the form of the *Cotidal lines* by which the motion of the tide wave is exhibited. He devotes one section of the paper to an investigation of the general form of these lines; and another to a nearer approximation to an accurate map of these lines, more especially as they exist in the German Ocean. The 4th section treats of the height of the tide in its total range from high to low water; the 5th relates to the diurnal inequality; the 6th to the semimenstrual inequality; and the 7th and last comprises general remarks on the tables which accompany the paper.

2. "On the Tides at the Port of London." By J. W. Lubbock, Esq., F.R.S.

The discussions of tide observations which the author has hitherto at various times laid before the Society, were instituted with reference to the transit of the Moon immediately preceding the time of high-water; from which the laws of the variation in the interval between the moon's transit and the time of high-water have been deduced. But the discussion of nineteen years' observations of the tides at the London Docks, which is given in the present paper, has been made with reference to the moon's transit two days previously, and proves very satisfactorily that the laws to which the phenomena are subject

accord generally with the views propounded long since by Bernoulli. The relations which the author points out between the height of high-water and the atmospheric pressure as indicated by the barometer are particularly interesting and important. The influence of the wind is also considered; and such corrections indicated as are requisite in consequence of the employment by several observers of solar instead of mean time.

3. "Discussion of the Magnetical Observations made by Captain Back, R.N., during his late Arctic Expedition." By Samuel Hunter Christie, Esq., M.A., F.R.S. Part II.

The author proceeds, in this paper, which is a sequel to his former communication, to discuss the observations made by Captain Back relating to the magnetic intensity, and which were of two kinds; the first, obtained by noting the times of vibration of a needle in the plane of the magnetic meridian; the second, by noting the times of vibration of three needles suspended horizontally according to the method of Hansteen. The results are given in the form of tables.

Before deducing results from these observations, the author describes a series of experiments instituted with each needle, for the purpose of determining the corrections necessary to be applied in order to reduce the intensities, which would result from observations made at different temperatures, to intensities at a standard temperature; and he gives formulæ for these corrections. He then determines the relative terrestrial magnetic intensities, at the several stations where observations were made, from the times of vibration of the dipping needle in the plane of the meridian, applying the corrections which he had obtained for difference of temperature; and gives the results in tables. A comparison is instituted between these results and a formula derived from the hypothesis of two magnetic poles not far removed from the centre of the earth. The author considers that this comparison is quite conclusive against the correctness of the formulæ, and consequently of the hypothesis itself, if applied to the results deduced from the observations in London, in conjunction with those in America; but that, in the tract of country comprised by Capt. Back's observations from New York to the Arctic Sea, the phenomena of terrestrial magnetic intensity are very correctly represented by the formula in question.

The author then proceeds to determine the intensity from the observations with horizontal needles, applying here, likewise, to the results, corrections for the difference in the temperatures at which the observations were made. In these results there are great discrepancies, which the author attributes to the inapplicability of Hansteen's method of determining the intensity by the times of vibration of horizontal needles to cases where the dip of the needle is very great, rather than to errors in the observations themselves, or to a variation in the magnetism of the needles employed. He concludes by a just tribute to the zeal which Captain Back has manifested in the cause of science, by availing himself of every opportunity of making these tedious observations, during an unknown and perilous navigation.

4. "On the Powers on which the Functions of Life depend in the more perfect Animals, and on the Manner in which these Powers are associated in their more complicated results." By A. P. W. Philip, M.D., F.R.S.

This paper is divisible into three portions. In the first, the author considers the functions and seat of each of the powers of the living animal; in the second, the nature of each power; and in the third, the manner in which they are associated in the more complicated results which constitute life.

Of these powers the simplest is the muscular, which consists merely in a contractile power residing in the muscular fibre itself: and various experiments are referred to in proof that it depends exclusively on the state of this fibre, and in no degree on that of the nervous system, which some physiologists have regarded as the real seat of this power: for, instead of being recruited, it is exhausted by the action of the nervous system upon it, as it is by other stimulants.

The next power considered is that of the nervous system, properly so called, in contradistinction to the sensorial system. The result of an extensive series of experiments made with a view to establish the exact line of distinction between these two systems, is that the functions of the nervous power are as remarkable for their complexity as that of the muscular power is for its simplicity. With regard to the nervous power it is shown that its functions (all of which are capable of existing after the sensorial power is withdrawn, and all of which fail when the nervous power is withdrawn,) are the following: 1. The excitement of the muscles of voluntary motion in all their actions; 2. The occasional excitement of the muscles of involuntary motion; 3. The maintenance of the process by which animal temperature is maintained; 4. The maintenance of the various processes of secretion; 5. The maintenance of the processes of assimilation. It farther appears, from several experiments, that the seat of the nervous power is exclusively in the brain and spinal cord; not, however, in any particular part, but in the whole extent of these organs, from the uppermost surface of the former to the lowest portion of the latter; with the exception only that the lower portions of the spinal cord partake less of this power than the rest. It appears also that the nerves are only the medium of conveying the influence of the above-mentioned organs; and their ganglions and plexuses are only the means of combining the power of all the parts of these organs; such combination being shown to be necessary to the due excitement of the muscles of involuntary motion, and for the maintenance of the functions of secretion and assimilation.

The remaining powers of the living animal are the sensorial powers, and the powers of the living blood. The first of these classes of powers has its seat, not in the whole brain and spinal cord, as is the case with the nervous power, properly so called, but in certain parts of them; these parts being, in man, almost wholly confined to the brain; while in some animals they extend also to a considerable portion of the spinal cord. The functions of the sensorial powers are those strictly termed mental, of which sensation and volition are the simplest, and

the only powers of this class which are concerned in the maintenance of life.

The functions of the living blood are evidently those of supplying the proper materials, in their requisite condition, (to the preservation of which the vital powers are essential,) for the action of the nervous power, properly so called, in the processes of secretion and assimilation. The seat of the powers of the blood is in itself; as appears from its retaining them for a short time after it is separated from the body.

These four vital powers, viz. the muscular, the nervous, the sensorial, and that of living blood, have no direct dependence on one another; for each can, for however short a time, exist independently of the others: but each has an indirect dependence, more or less remote, on all the other three for the maintenance of their organs.

The author then proceeds to inquire into the nature of these several powers. The sensorial and muscular powers, and the powers of the living blood, are manifestly peculiar to the living animal, no analogous powers being perceptible in inanimate nature. But this exclusiveness does not belong to the nervous power, for experiment shows us that when the oxygen and carbon of the blood are combined by its influence, a substance results which is identical with that produced in the laboratory of the chemist. An analogy, too strong to be wholly disregarded, exists therefore between its effects and those of the powers which operate in inorganic nature. This consideration, as well as others stated by the author, induced him to make many experiments to determine how far the other functions of the nervous influence bear a similar analogy to the operations of inanimate nature; and, in particular, to inquire whether voltaic electricity, applied under the same circumstances as those under which the nervous influence operates, and applied after the removal of that influence, and the consequent cessation of its functions, would produce the same effects. His endeavours were crowned with complete success; all the functions of the nervous power being capable, as far as he and others could judge, of being perfectly performed by voltaic electricity. He states that the results of his experiments on this subject were confirmed by a public repetition of them both in London and in Paris; as were likewise those of another set of experiments suggested by the following reasoning. If the nervous influence could be made to pass through any other conductor than the nervous textures to which it belongs in the living animal, we should have a proof, independent of all other evidence, that this influence is not a vital power, properly so called; because it must be universally admitted that such a power can exist only in the texture to which it belongs. In this attempt he was for some time baffled; but at length, overcoming the obstacles which had impeded his efforts, he succeeded: and, having undergone the same public ordeal as the former, the results are no longer questioned. From the whole of these experiments the author thinks himself warranted in concluding that the nervous influence is not a vital power, properly so called; and that when it is admitted that voltaic electricity is capable of performing all its functions, the proposition that they

are powers of a different nature would be a contradiction in terms, for it is only by its properties that any principle of action can be distinguished.

He refers, in confirmation of these inferences, to the recent investigations of Mr. Faraday, from which it appears that electricity is the agent in all chemical processes; to the facts which prove that all the functions of the nervous influence, properly so called, are of a chemical nature; and also to the late experiments of Dr. Davy on the Torpedo, tending to show that the electric power, peculiar to electric animals, is a function of the brain, and thus affording direct proof that the brain has the power of collecting and applying, even according to the dictates of the will, the electric power.

It further appears, from the facts referred to in this paper, that, whenever we can trace any analogy between the functions of the living animal and the operations of inanimate nature, an agent belonging to the external world is employed; that these functions are the results either of such agents acting on vital parts, or of vital parts acting on them; and that the sensorial functions, on the other hand, in which no such analogy can be traced, are the effects of vital parts acting on each other, and influencing each other by their vital properties alone.

In the concluding part of the paper the author considers the various functions of the living animal as forming two systems, in a great measure distinct from one another, in each of which all its powers are employed, but in very different ways: the object of the one of these systems being the maintenance of the body itself; of the other, the maintenance of its intercourse with the external world. The manner in which the different powers of the living animal are employed in the construction of each of these systems is pointed out; and the bonds of union which exist between them, and thus form the living body into a whole, no part of which can be affected without tending more or less to affect every other, are considered. These bonds of union consist chiefly in the employment of the same powers in the construction of both systems, and in the function of respiration, which so extensively influences all other functions both in health and disease, as pointed out by the author in his papers on the nature of sleep and death, and which differs from all the other vital functions in partaking of the sensorial as well as of all the other powers of the living animal.

5. "On the Respiration of Insects." By George Newport, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

Although a multitude of facts has been collected relating to the physiology of respiration in insects, attention has seldom been directed to the variations exhibited in this function in the different periods of their existence. The author gives an account, in this paper, of the anatomical and physiological peculiarities which he has noticed in various insects, in their three states of larva, pupa, and imago. He traces all the several changes which the tracheæ and spiracles undergo during their transformations; describing particularly the successive development of the air vesicles in connexion with the power of flight.

The system of muscles, both of inspiration and of expiration, is minutely detailed, and their various modes of action examined. He next investigates the series of nerves appropriated to the exercise of the respiratory function, and establishes a distinction in the offices of these nerves, corresponding to the sources from which they derive their origin, and presenting remarkable analogies with similar distinctions in the nerves of vertebrate animals. The manner in which respiration is performed, and the phenomena presented with regard to this function under various circumstances, such as submersion, and confinement in unrespirable or deleterious gases, are next considered. An account is then given of a series of experiments made with a view to determine the quantity of oxygen consumed, and of carbonic acid produced, by the respiration of various kinds of insects in different states, from which the conclusion is drawn that the quantity of air deteriorated is governed by several circumstances not necessarily connected with the natural habits of the species. When the insect is in its pupa state, and in complete hybernation, its respiration is at its minimum of energy: and, on the contrary, it is at its maximum when the insect is in the imago state, and in the condition of greatest activity.

In the concluding section of the paper the author institutes an inquiry into the capabilities which insects possess of supporting life, during longer or shorter periods, when immersed in different media: and gives a tabular view of the results of numerous experiments which he made on this subject. It appears from these observations that the order in which these media possess the power of extinguishing vitality is the following: viz. hydrogen, water, carbonic acid, nitrous acid gas, chlorine, and cyanogen. Some of these agents, however, affect respiration much more rapidly than others, which, though their action is slower, are eventually more fatal to the insect.

6. "Démonstration de l'égalité à deux droits de la somme des angles d'un triangle quelconque, indépendamment de la théorie des parallèles, et de la considération de l'infini." Par M. Paulet, de Genève. Communicated by P. M. Roget, M.D., Sec. R.S.

The author demonstrates the equality of the sum of the angles of a triangle to two right angles, by the aid of a preliminary theorem, of which the following is the enunciation. A straight line forming an acute angle with another straight line, will, when sufficiently produced, meet any line, perpendicular to the latter, and situated on the side of the acute angle.

7. "Experimental Researches into the Physiology of the Human Voice." By John Bishop, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

The following are the conclusions deduced by the author from the inquiries which form the subject of the present paper.

1. The vibrations of the glottis are the fundamental cause of all the tones of the human voice.
2. The vibrating length of the glottis depends conjointly on the

tension and resistance of the vocal ligaments, and on the pressure of the column of air in the trachea.

3. The grave tones vary directly, and the acute tones inversely, as the vibrating length and tension of the vocal ligaments.

4. The vocal tube is adjusted to vibrate with the glottis by the combined influence of its variations of length and of tension.

5. The elevation of the larynx shortens the vocal tube; and its depression produces the contrary effect. The diameter and extension of the tube vary reciprocally with the length.

6. The falsetto tones are produced by a nodal division of the column of air, together with the vocal tube, into vibrating lengths.

7. The pitch of the vocal organs, when in a state of rest, is, in general, the octave of their fundamental note.

The paper is illustrated by several drawings.

8. "Du Son et de l'Electricité." Anonymous, with the signature of *Hermes*. Being a Prize Essay for the Royal Medal.

This paper contains the account of a great number of facts and observations, collected from various sources, on the subject of the relations subsisting between electricity, the production of sound, the crystallization of bodies, the transmission of heat, the emission of light, and various atmospheric changes; from the consideration of which the general conclusion is drawn that all these phenomena are perhaps the results of the undulations of some ponderable material.

9. "Physiological Remarks on several Muscles of the Upper Extremity." By F. O. Ward, Esq., Medical Student at King's College, London. Communicated by P. M. Roget, M.D., Sec. R.S.

There is a remarkable fold in the tendon of the pectoralis major muscle, described by all anatomists, but the purpose of which has never yet, as the author believes, been explained. The muscle itself consists of two portions, one smaller and upper, arising from the clavicle, and passing downwards and outwards to an insertion in the humerus at a greater distance from the shoulder-joint than the place where the tendon of the larger and lower portion of the muscle, which arises from the sternum and ribs, and has a general direction upwards and outwards, terminates. Thus the respective portions of tendon belonging to the two divisions of the muscle are found to cross each other; the margin of that proceeding from the lower division passing behind, and appearing above that which proceeds from the upper fibres of the muscle. The forces exerted by each portion of the muscle being thus applied to parts of the bone at different distances from the fulcrum, act with different mechanical powers; which the author finds in every case to correspond exactly with the variations in the effects required to be produced, under different circumstances, by these muscular actions. Those muscular fibres, the tendon of which is inserted nearest to the centre of motion, and which consequently act by a shorter lever, are adapted to motions requiring a less force, but a greater velocity: and such is precisely the mechanical condition of the lower portion of the pectoralis major, which is employed more

especially in bringing down the arm, when previously raised, as in striking with the hammer, pickaxe, &c., where velocity is chiefly required, the weight of the instrument held in the hand sufficiently supplying the diminution of force. On the contrary, the lever by which the upper portion of the same muscle is enabled to act being, from the more distant insertion of its tendon, of greater length, is calculated to procure force at the expense of velocity, and is therefore peculiarly fitted for the performance of those actions by which the arm is elevated and weights raised; these being precisely the actions in which such muscles are employed. Adverting, also, to the respective obliquities in the direction of their action, the author traces the same express correspondence between the mechanism employed and the purpose contemplated. He pursues the same line of argument and obtains the same results in extending the inquiry to the structure and uses of those muscles, such as the coraco-brachialis, and the anterior fibres of the deltoid, which cooperate with the upper division of the pectoralis major; and the teres major and latissimus dorsi, which combine their actions with that of the lower division of the pectoral muscle.

This diversified adaptation of parts, he observes, forms the chief characteristic of the mechanism of Nature. Operating with unlimited means, she yet works with scrupulous economy; in all her structures no power is redundant, nor a single advantage lost: so that, however completely an arrangement may be subservient to one primary purpose, we find, on renewed examination, an equally accurate adjustment to various secondary and no less important ends.

The author then proceeds to inquire into the methods employed for determining the absolute and relative strength of muscles; and proposes, for that purpose, the application of the constant and equable stream of galvanism afforded by the new battery invented by Mr. Daniell.

10. "An Experimental Inquiry into what takes place during the Vinous, the Acetous, and different Putrefactive Fermentations of dissolved Vegetable Matter; and an Examination of some of the Products." By Robert Rigg, Esq. Communicated by P. M. Roget, M.D., Sec. R.S.

The author describes with great minuteness a long train of experiments on the subjects announced in the title of the paper. His first object of inquiry is into the nature of the changes which take place during the vinous fermentation; and the conclusion to which he arrives is, that in the formation of the products resulting from this process sugar is not the only vegetable principle which is decomposed, but that the changes consist in the combination of two equivalents of carbon, derived from the sugar of the malt, or other vegetable matter, ($= 12 \cdot 24$) with two equivalents of hydrogen from water ($= 2 \cdot$) forming $14 \cdot 24$ parts of olefiant gas: and in the combination of one equivalent of the carbon from the sugar, &c. ($= 6 \cdot 12$) with two equivalents of oxygen from water, ($= 16 \cdot$) forming $22 \cdot 12$ parts of carbonic acid. He thinks that, on this change taking place, the olefiant

gas is held in solution by the water by an affinity which can be overcome, and that the foreign matter which, with the carbon, formed the sugar, or other vegetable substance, is then at liberty to form new combinations. He finds that the products resulting from the decomposition exceed the weight of the sugar, or other vegetable matter, by about 10 per cent. of the former, and from 11 to 12 per cent. of the latter, as calculated according to the prevailing theory that sugar, or vegetable matter, is the only substance decomposed during the process of vinous fermentation.

From his analysis of sugar he obtains certain proportions of water and of carbonic acid which are different from those given by preceding chemists, the carbonic acid being 45 to 45.5 per cent. His analysis of alcohol gives him 59.7 to 60 per cent. of olefiant gas, the remainder being water.

His experiments on the acetous and putrefactive fermentations are numerous and elaborate, and the results, which are nearly the same as those of former analyses, are given in a tabular form. He finds that in the acetous fermentation 57 parts by weight of olefiant gas, 5 of sugar, or other vegetable matter, and 64 of oxygen from the atmosphere, combine to form 100 parts of acetic acid, and about 24 of water; leaving an insoluble substance at liberty to form other combinations: and thus includes in his account of this process the decomposition of vegetable matter, which is overlooked in the generally received theory.

During the putrefactive fermentation of vinous fermented liquors, when exposed to the atmosphere, the author considers that one equivalent of carbon from the olefiant gas ($= 6.12$) unites with two of oxygen from the atmosphere ($= 16$) to form 22.12 parts of carbonic acid: while one equivalent of hydrogen from the olefiant gas ($= 1$) combines with one of atmospheric oxygen ($= 8$) to form 9 parts of water; a portion of sugar, or other vegetable matter, being also decomposed; and an insoluble substance remaining, which, on exposure to the air, undergoes further decomposition, and forms products highly deleterious. The author is not aware that this latter decomposition has been hitherto noticed.

During the putrefactive fermentation of acetic acid exposed to the atmosphere, he regards one equivalent of carbon from acetic acid ($= 6.12$) as combining with two of atmospheric oxygen ($= 16$) to form 22.12 parts of carbonic acid: the oxygen and hydrogen, with which the carbon had formed the acetic acid, remain in the state of water, as they are found by analysis in this substance: a portion of vegetable matter is also decomposed; and an insoluble substance left behind. Other substances are also formed during some of the changes resulting from exposure to the air.

During the direct putrefactive fermentation of solutions of sugar, or other vegetable matters, he finds, that one equivalent of its carbon ($= 6.12$) unites with two of atmospheric oxygen ($= 16$) to form 22.12 parts of carbonic acid; leaving the water and an insoluble substance to undergo changes as before mentioned. The olefiant gas, formed during the vinous fermentation, whether the liquor be in the

state of vinous fluid, weak spirit, strong spirit, or even of alcohol, or ether, is subject to precisely the same decomposition, under favourable circumstances for such changes, without any action upon, or relation to the water which may happen to be combined with it in each kind of liquor. This olefiant gas cannot, either by distillation or other means, be separated along with any of the water with which it is at first combined, and again united with the same materials, without forming a compound different from the original one: and in proportion as water is, by any means, removed, we obtain it in a somewhat different state; and this happens without reference to a separate and distinct substance which we may call alcohol, or ether. Thus neither of these two ill-defined substances ought to be regarded as a separate and distinct principle; but the whole series of bodies, from the weakest fermented liquor, separated from its vegetable matter, to the most highly rectified ether, consist only of different combinations of olefiant gas, the first product of vinous fermentation, and water.

11. "On the Chemical Changes occurring in Seeds during Germination." By the same.

The author infers, from his researches on the subject of his second paper, that during the process of germination there is a production of alcohol, and that oxygen unites with olefiant gas, under the influence of the radicle and plumula. He accounts for the increase of temperature during germination by an alleged difference in the specific heats of the principles before and after that process has commenced; but the methods he employed for establishing the reality of this difference are not detailed.

The following are the principal conclusions to which the author arrives:

1. Seeds may, by careful desiccation, be deprived of much water without injuring their vegetating organs.
2. Their capacity for absorbing water varies with the temperature at which they are kept.
3. The increase taking place in their volume by the absorption of water is influenced by temperature.
4. On steeping seeds in water at one temperature the vinous fermentation takes place, but at another this process does not occur.
5. A decomposition takes place in seeds previously to their germination, and the products are carbonic acid and olefiant gas.
6. The abstraction of carbon from seeds by the oxygen of the atmosphere is not, as is generally supposed, the specific action which gives rise to germination; but it rather conduces to putrefaction.
7. The germination of seeds appears to be an action taking place between the olefiant gas, which has been previously formed by a vinous fermentation, and the oxygen of the atmosphere; and is effected by the peculiar operation of the plumula and the rootlets.
8. This decomposition and combination of the different elements go on, in well-regulated processes, as long as there is any farinaceous matter to be decomposed: the food of the plant being at this time always the oxygen of the atmosphere, and the newly-formed olefiant

gas, differing in equivalent combinations, according to the peculiar constitution of the plant; and thus the foundation is laid for all that prodigious diversity which characterizes the numberless species of the vegetable creation.

12. "A Comparison of the late Imperial Standard Troy Pound Weight with a Platina copy of the same, and with other Standards of authority." Communicated by Professor Schumacher, in a Letter to Francis Baily, Esq., V.P. and Treas. of the Society.

Professor Schumacher being desirous of procuring an accurate copy of the English Imperial Standard Troy pound weight, for the purpose of comparison with the Danish weights, applied to Capt. Kater, requesting him to cause such copy to be made; which was accordingly done. It was made of brass by Bate; but the result of the weighings not being satisfactory to Professor Schumacher, he desired to have a second copy forwarded to him. As these two copies did not agree in their results, the first was returned to Capt. Kater with a request that he would repeat the weighings. The result confirmed Professor Schumacher's suspicions: and as it was not thought proper that, in an affair of so much importance as the comparison of the standard weights of two nations, any source of discordance should exist, or even be suspected, (the preceding experiments having been made with a *copy* of the Imperial standard weight) the Danish Government sent over Capt. Nehus (of the Royal Danish Engineers) to this country for the express purpose of making comparisons with the *original* standard, in the possession of the Clerk of the House of Commons.

The weighings took place in the Apartments of this Society, and were partly made with Ramsden's balance, belonging to the Society. Besides the first brass weight above mentioned, there was another brass weight made by Robinson, a platina weight made by Cary, the brass pound weight belonging to the Royal Mint, and the platina pound weight belonging to this Society. These were all subjected to a most rigid and accurate series of weighings by Capt. Nehus, in which every precaution was taken to insure the most correct results. It would be impossible here to follow Capt. Nehus through all his details: but it may be sufficient now to state that upwards of 600 comparisons were made with the English Imperial standard, all of which are apparently very accordant; but, on account of a singular circumstance connected with the *original* standard, do not possess that degree of precision, nor afford that satisfaction which ought to attach to an affair of so much importance. For, it appears that not only the specific gravity of the original standard had never been ascertained, but that we are even ignorant of the kind of metal of which it was composed: some persons maintaining that it was of brass, others of copper, and others of bell-metal. And, as the original was totally destroyed in the late fire which consumed the two Houses of Parliament, we cannot now supply this omission. It is well known that the specific gravity of brass may vary from 7.5 to 8.5; so that a difference of at least $\frac{1}{4}$ of

a grain might arise from this circumstance alone ; setting aside a number of other particulars that require minute attention, and which do not seem to have been attended to in former experiments of this kind. In fact, as Professor Schumacher remarks, though we have thus five different pounds in excellent preservation, and compared with the lost standard, with the greatest care and the best instruments, though the number of these comparisons exceeds 600, yet there still remains an uncertainty as to its real weight ; and this solely on account of its specific gravity and expansion not being known. And, he adds, that it is to be hoped that no pound will in future be declared a legal standard unless these elements (the knowledge of which is indispensable even for a single comparison with a good balance) are previously determined with the greatest possible precision.

Besides the account of these numerous weighings, which are stated in detail, Professor Schumacher has given various formulæ and tables which will be found of great use and application in any future experiments of a like kind that may be undertaken.

13. "On the Application of a New Principle in the Construction of Voltaic Batteries, by means of which an equally powerful current may be sustained for any period required ; with a description of a sustaining battery recently exhibited at the Royal Institution." By Frederick W. Mullins, Esq., M.P., F.S.S. Communicated by N. A. Vigors, Esq., F.R.S.

The method resorted to by the Author for obtaining a continuous voltaic current of equal intensity, is the same in principle as the one employed by Professor Daniell, and described by him in his paper recently presented to the Royal Society, and published in the Philosophical Transactions ; namely, the interposition of a thin membrane between the two metals in the voltaic circuit, so as to allow of the separation of the different fluids applied respectively to each metal : the fluid in contact with the zinc being a mixture of diluted sulphuric and nitric acids ; and that in contact with the copper being a solution of sulphate of copper. The author reserves for a future paper the details of the results he has obtained, with regard to the relations between the intensity of effect, and the extent and disposition of the metallic surfaces : but states that he has obtained powerful electric action by bringing the membrane into contact with the zinc ; the latter having no acid applied to it, and the only fluid employed being the solution of sulphate of copper.

14. Anonymous Essay, entitled "Scoperta della Causa Fisica del Moto." Presented to the Royal Society, with a view to obtaining one of the Royal Medals for 1836.

The Author commences by an historical review of the opinions of almost every philosopher, both ancient and modern, who has treated of the subject of motion, from Pythagoras to Le Sage : and proceeds to state his own ideas relating to the cause of motion,

founded on the hypothesis that the ultimate atoms of all matter have a pyramidal figure.

15. "An Experimental Inquiry into the Modes of Warming and Ventilating Apartments." By Andrew Ure, M.D., F.R.S.

The Author, having been consulted by the Directors of the Customs Fund of Life Assurance, on the mode of ventilating the Long Room in the Custom House, and deeming the subject one of great public interest, was induced to lay the result of his observations and experimental inquiries before the Royal Society. In this room, about two hundred persons are busily engaged in transacting the business of the Institution. All these persons are found to suffer more or less from ailments of the same general character, the leading symptoms of which are a sense of fulness and tension in the head, flushing of the face, throbbing of the temples, giddiness, and occasional confusion of ideas, depriving them of the power of discharging their duties, in which important and frequently intricate calculations are required to be gone through. These symptoms of determination of blood to the head are generally accompanied by coldness and languid circulation in the feet and legs, and by a feeble, and frequent, as well as quick and irritable pulse. On examining the air of the room by appropriate instruments, the author notices more especially three circumstances in which it differs from the external air: first, its temperature, which is maintained with great uniformity within a range of 62° to 64° ; secondly, its extreme dryness, which, on one occasion, measured by Daniell's hygrometer, was 70 per cent.: and thirdly, its negatively electrical state, as indicated by the condensing gold-leaf electrometer. In all these qualities the air respired by the inmates of the room bears a close resemblance to the pestilential blasts of wind which, having passed rapidly over the scorching deserts of Arabia and Africa, constitutes the *Simoom* of those regions, and is well known by its injurious effects on animal and vegetable life. To these noxious qualities is superadded, as in the air of all rooms heated through the medium of cast-iron pipes or stoves, an offensive smell, arising partly from the partial combustion of animal and vegetable matters always floating in the atmosphere of a town, and perhaps also from minute impregnations of carbon, sulphur, phosphorus, or even arsenic, derived from the metal itself. The Author expresses his surprise that in the recent report of the Parliamentary Committee on the subject of ventilation, no reference is made to the methods employed for that object in factories, although they afford the best models for imitation, being the results of innumerable experiments made on a magnificent scale, with all the lights of science, and all the resources of the ablest engineers. He proceeds to describe these methods; and is then led to investigate the comparative efficiency, with a view to ventilation, of a draught of air resulting from a fire and chimney, and that produced by the rotation of a fan-ventilator. He shows that a given quantity of coal employed to impart motion to the latter, by means of a steam-engine, produces a ventilating

effect 38 times greater than can be obtained by the consumption of the same fuel in the ordinary mode of chimney ventilation. Accordingly, he strongly advises the adoption of the former in preference to the latter: and inveighs against the stove-doctors of the present day, who, on pretence of economy and convenience, recommend the slow combustion of a large body of coke, by means of a slow circulation of air; under which circumstances, it is well known to chemists that much carbonic oxide, a gas highly pernicious to all who respire it, is generated; accompanied, at the same time, by a comparatively small evolution of heat. In order to obtain the maximum quantity of heat from a given mass of fuel, its combustion, he observes, should be very vivid, and the evolved caloric should be diffused over the largest possible surface of conducting materials; a principle which has been judiciously applied in several French factories. It has been proved that work-people employed in calico-drying rooms, heated according to the plan here reprobated, become wan, emaciated, and diseased; while in rooms in which the air is more highly heated by means of steam-pipes, they preserve their health and florid complexion.

16. "An Experimental Inquiry into the Relative Merits of Magnetic Electrical Machines and Voltaic Batteries, as Implements of Philosophical Research." By William Sturgeon, Esq., Lecturer on Natural and Experimental Philosophy at the Honourable East India Company's Military Academy at Addiscombe. Communicated by P. M. Roget, M.D., Sec. R.S.

The first part of this paper is occupied by a description of two forms of constructing the magnetic electrical machine, which the author has adopted; and the second, with the particulars of some experiments made with a view to determine the respective powers of these machines as compared with the common voltaic battery. In the first form of the instrument, a reel, round the periphery of which 200 feet of copper wire, one 20th of an inch in diameter and covered with stout sewing-silk, are coiled, is made to revolve on a spindle, placed in the axis of a system of horse-shoe magnets, so as to remain within the branches of the latter during its whole revolution. The electric currents produced in the copper wire by magnetic induction, while the coil is moved at right angles to the plane of the magnets, are conducted by means of four semicircular metallic flanges attached to the spindle, into cisterns of mercury, the one being positive, and the other negative; and which consequently act as the two poles of the battery. In the second form of the apparatus, a piece of soft iron, of which the ends are bent into the shape of two arms, and which is surrounded with a coil of 300 feet of copper wire, is made to revolve in front of the poles of a horse-shoe magnet; its axis of motion coinciding with that of the magnet; and the electrical currents determined in the wire by this rotation, being collected in the same manner as in the former instrument.

The author next details several series of experiments which he made for the purpose of ascertaining the relation observable be-

tween different velocities of rotation in these instruments and the corresponding effects : first, with regard to the deflection of a magnetic galvanometer ; secondly, with regard to chemical decompositions ; thirdly, with regard to the production of sparks ; and lastly, with regard to the intensity of the shock communicated to the human body. He compares the effects produced by the magnetic electrical battery, first, when the coil consisted of one continuous length of wire ; secondly, when the coil was doubled upon itself so as to constitute two sets of conductors of half the length of the former ; thirdly, when, upon being again doubled, it composed four conductors of one quarter of the length of the first ; and lastly, when, on being doubled a third time, the electric current was made to pass through eight wires, each one eighth of the original length of the single wire. It was found that by thus multiplying the channels of conduction, although both the magnetic and the luminous effects continue to be produced with scarcely any sensible difference of intensity, the power of effecting chemical decompositions becomes more and more impaired, and the physiological influence is weakened in a still more remarkable degree. In the four-stranded coil, indeed, no shock whatever could be produced, however rapidly the instrument was made to revolve. The author endeavours to account for these variations of effect by the diminution of velocity in the electric current, its quantity remaining unaltered, consequent on its division into several streams by the multiplied channels offered to its progress. He also tried the effects of conjoining the magnetic electrical machine with ordinary voltaic combinations ; sometimes acting in cooperation, and at other times in opposition to one another ; and notices the corresponding results, which were sufficiently accordant with theory.

17. "Welt Mechanik." By M. Kropalschek.

The object which the author has in view, in this paper, is to overturn the theory of universal gravitation, as regulating the planetary motions. The memoir is divided into two parts ; in the first, he disputes the accuracy of Kepler's law respecting the description of equal areas in equal times, and endeavours to confute the fundamental doctrines of astronomy relating to the elliptical orbit of the earth, the difference between solar and mean time, and the whole theory of the motions of the moon and the planets. In the second part, the author enters into a detailed exposition of his own views of the mechanism of the heavens ; and devotes 215 closely written pages to the development of a perfectly new hypothesis, which he advances, founded on a supposed variation of the progressive motion of the planets, in an orbit perfectly circular, and by which he thinks he can explain all the phenomena they present to observation.

18. "Plan et Esai d'un nouveau Catalogue Sidéral, avec une représentation graphique, et une loi de simple et régulière distribution des étoiles autour du Pole, qui pourra fournir plusieurs avantages à

l'Astronomie pratique." By Professor Joseph Bianchi, Superintendent of the Observatory at Modena.

The Author proposes the construction of a new sidereal catalogue, accompanied with a graphic representation of all the stars visible within the field of view at each observation, by means of the meridian transit of the most conspicuous stars across the field of a telescope of four inches aperture, attached to a three-feet circle. He directs this telescope to any elevation of the heavens that happens to be clear; and bringing any conspicuous star to the horizontal wire, he watches its transit over the two first vertical threads; then, suddenly intercepting the light, makes a diagram of all the stars in the field down to the 12th magnitude; and this he performs with sufficient expedition to enable him, on restoring the light, to observe the transit of his principal star over the fourth and fifth threads. The author has appended to the description of his method explanatory drawings, displaying 600 fields, of which the principal star in each, has its right ascension and declination determined. He subjoins some remarks on the rate of clocks, as influencing the observations on the upper, lower, and opposite passages; and proposes a plan for a system of symbols expressive of the relative magnitude of the stars recorded in his catalogue.

The author farther states as one of the most important results of his researches the probable existence of a general and curious law of position in the stars, namely, that they are distributed in pairs; each star having a corresponding one in the opposite meridian, very nearly of the same declination and magnitude; a coincidence which he considers as extremely favourable to the execution of his project for the accurate determination of the position in the heavens of every star.

19. "On the Composition and Decomposition of Mineral Waters." By the Rev. George Cooke, LL.B. Communicated by J. G. Children, Esq., Sec. R.S.

20. "Inquiries concerning the Elementary Laws of Electricity," Part II. By William Snow Harris, Esq., F.R.S.

21. "A New Theory of the Constitution and Mode of Propagation of Waves on the Surface of Fluids." By H. J. Dyar, Esq. Communicated by Edward Turner, M.D., F.R.S.

The Society adjourned over the long vacation, to meet again on the 17th November next.

June 23, 1836.

At a Special General Meeting of the Royal Society, convened by order of H. R. Highness the President and Council, to take into consideration the principle of the Resolution passed on the 5th of May, which goes to withhold the thanks of the Society from the author of a work presented by him to the Society ;

FRANCIS BAILY, Esq., V.P. and Treasurer, in the Chair ;

The Secretary, by direction of the Chairman, read a requisition, signed by Dr. Granville and five other Fellows, to convene a Special General Meeting of the Royal Society for the purpose of considering and determining the necessity of expunging from the Journal-Book of the Society the minutes of certain Resolutions passed at three several ordinary meetings on account of an alleged informality, and also the principle of the Resolution of the 5th of May, which goes to withhold the thanks of the Society to the author of a work presented by him to the Society, which requisition was delivered to the Secretary at the ordinary meeting on the 2nd instant.

The Chairman then informed the Society, that, upon the above requisition being laid before the Council, they passed the following resolutions, viz.

"That it is the unanimous opinion of His Royal Highness the President, and the Council, that no Special Meeting has the power of expunging minutes of past proceedings of the Society."

"That a General Special Meeting of the Society be called on the 23rd instant, at two o'clock, for the purpose of taking into consideration that part of the above requisition which proposes to afford to the Society an opportunity of taking into consideration the principle of the Resolution passed on the 5th ult., which goes to withhold the thanks of the Society from the author of a work presented by him to the Society."

The Chairman then made a statement of what had taken place at the meetings of the Society with regard to the Resolutions referred to in the above requisition.

On being asked by a Fellow present, by what authority the present meeting had been convened, he referred him to Statute I. Chap. XII. of the Statutes, which is as follows :

"The President or Council may at any time call a Special General Meeting of the Society when it may appear to them to be necessary."

It was then moved and seconded, That, in the opinion of this meeting, the meeting of May the 5th exercised a sound discretion in refusing thanks to Dr. Granville for his publication entitled "The Royal Society in the XIXth Century"; which motion, being put, was carried in the affirmative.

